Lean 6-Sigma Program

California Department of Transportation

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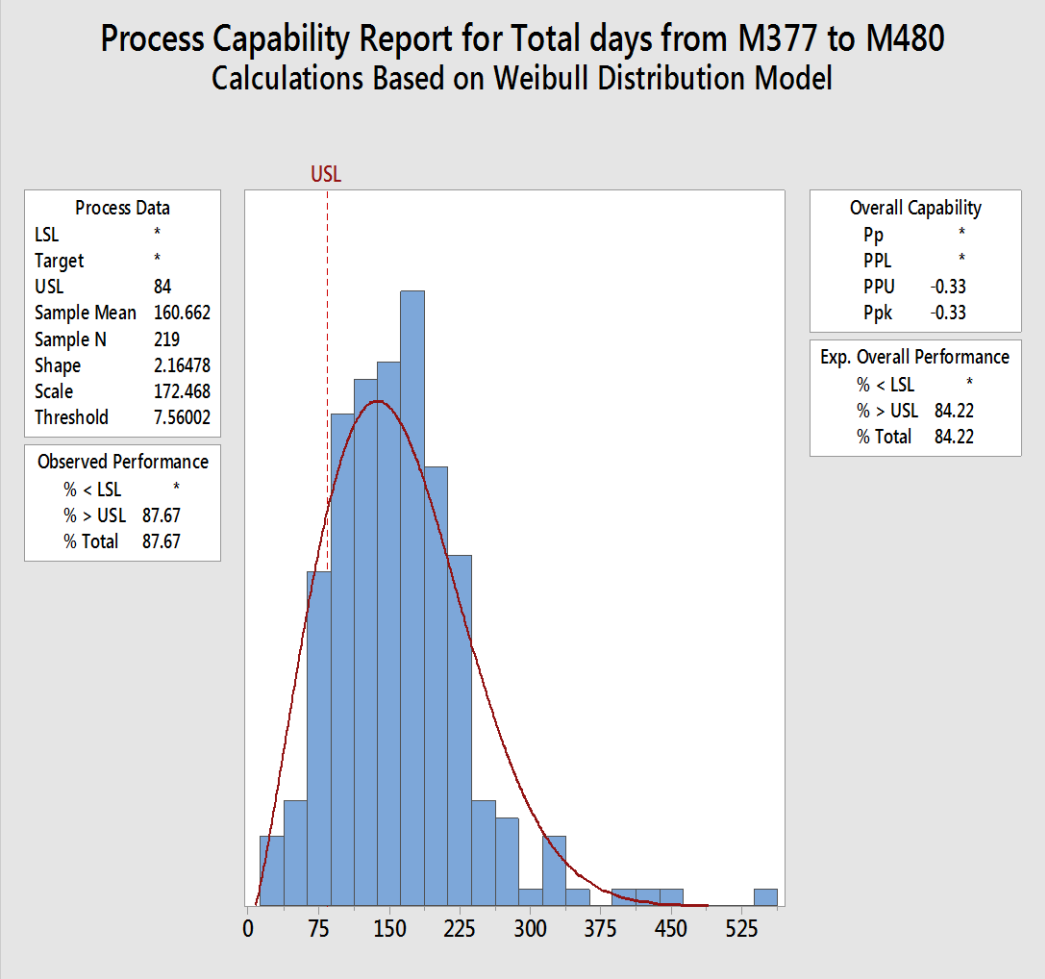
GLOBAL PRODUCTIVITY SOLUTIONS

Reduce PS&E Processing Timeline

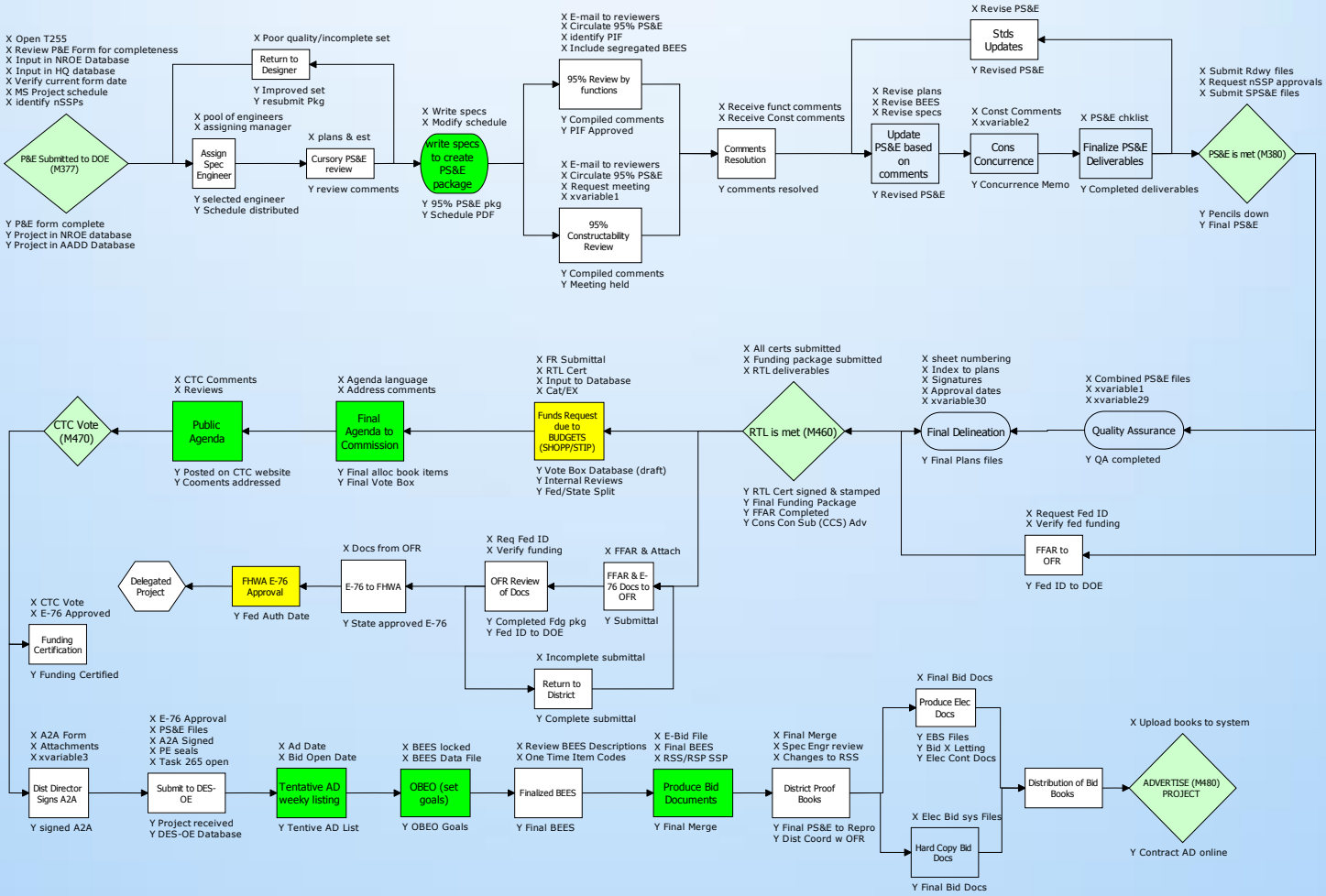
- **Problem Statement:** *The typical 24-week timeline to prepare roadway contract documents is too long, increases costs, and delays construction*
- **Objective:** *Reduce the processing time from 24 to 12 weeks*
- **Project Team:**
  - ***Greg Wong – HQ CTC Liaison***
  - ***Lyle Stockton – HQ Programming***
  - ***Fermin Barriga – NR Design***
  - ***Patrick Bishop – NR Office Engineer***
  - ***Dung Nguyen – DES Office Engineer***
  - ***Ted Miyashiro – DES Office Engineer***
  - ***Masoud Taheri – Federal Liaison***
  - ***Raul Lerma – Federal Liaison***
  - ***Bob Lowrie – D11 PPM***

Baseline Capability



- Current Process
- Desired spec limit is 84 days (12 wks)
- Current average 160 days (appx 24 wks)
- Current Maximum 530 days
- 17% within Spec
- Non normal distribution

Initial Process Map



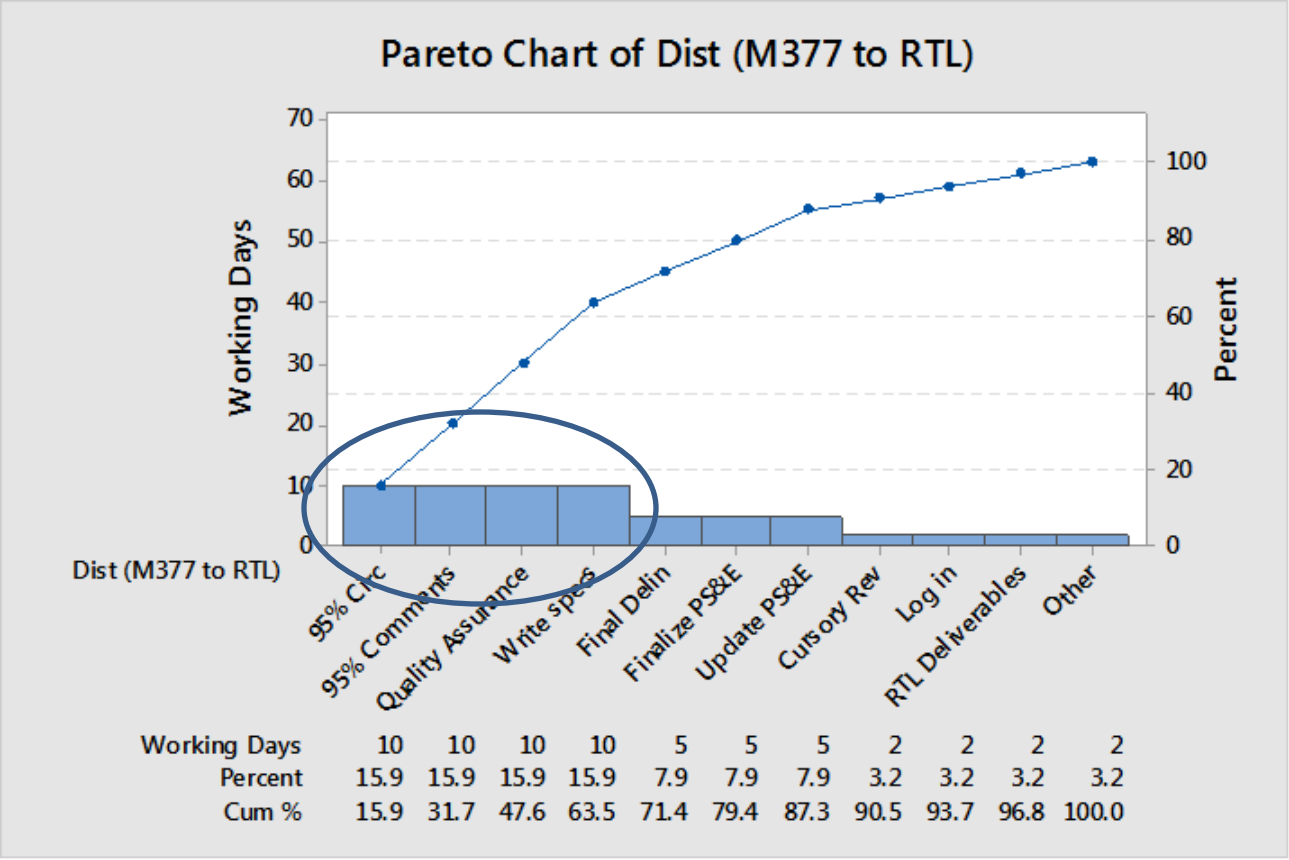
- At least 34 steps with only 6 value added (in green)

Analysis Tools

Analytical tools used to determine critical x's :

- Fishbone Diagram
- Pareto Charts
- Failure Modes and Effects Analysis (FMEAs)
- Multi-Vari Analysis
- Hypothesis Tests

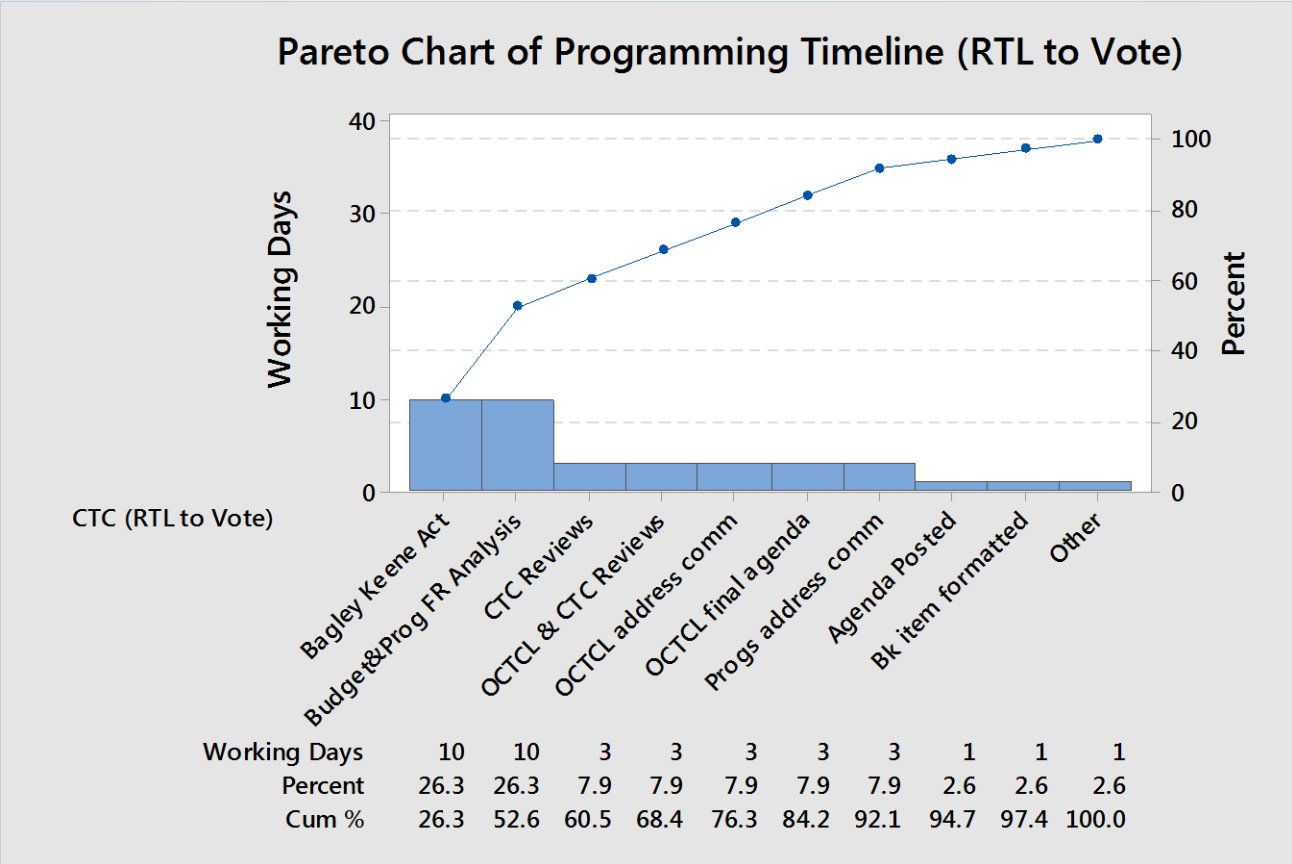
Key Analytical Finding 1



Dist (M377 to RTL)	95% Circ	95% Comments	Quality Assurance	Write specs	Final Delin	Finalize PS&E	Update PS&E	Cursory Rev	Log in	RTL Deliverables	Other
Working Days	10	10	10	10	5	5	5	2	2	2	2
Percent	15.9	15.9	15.9	15.9	7.9	7.9	7.9	3.2	3.2	3.2	3.2
Cum %	15.9	31.7	47.6	63.5	71.4	79.4	87.3	90.5	93.7	96.8	100.0

- Four activities add up to 40-working days (or 8 weeks). At least 6-weeks are for reviews and quality assurance.

Key Analytical Finding 2



- The funding allocation timeline is about 8-weeks. However, if it runs in parallel it shortens the current timeline significantly.

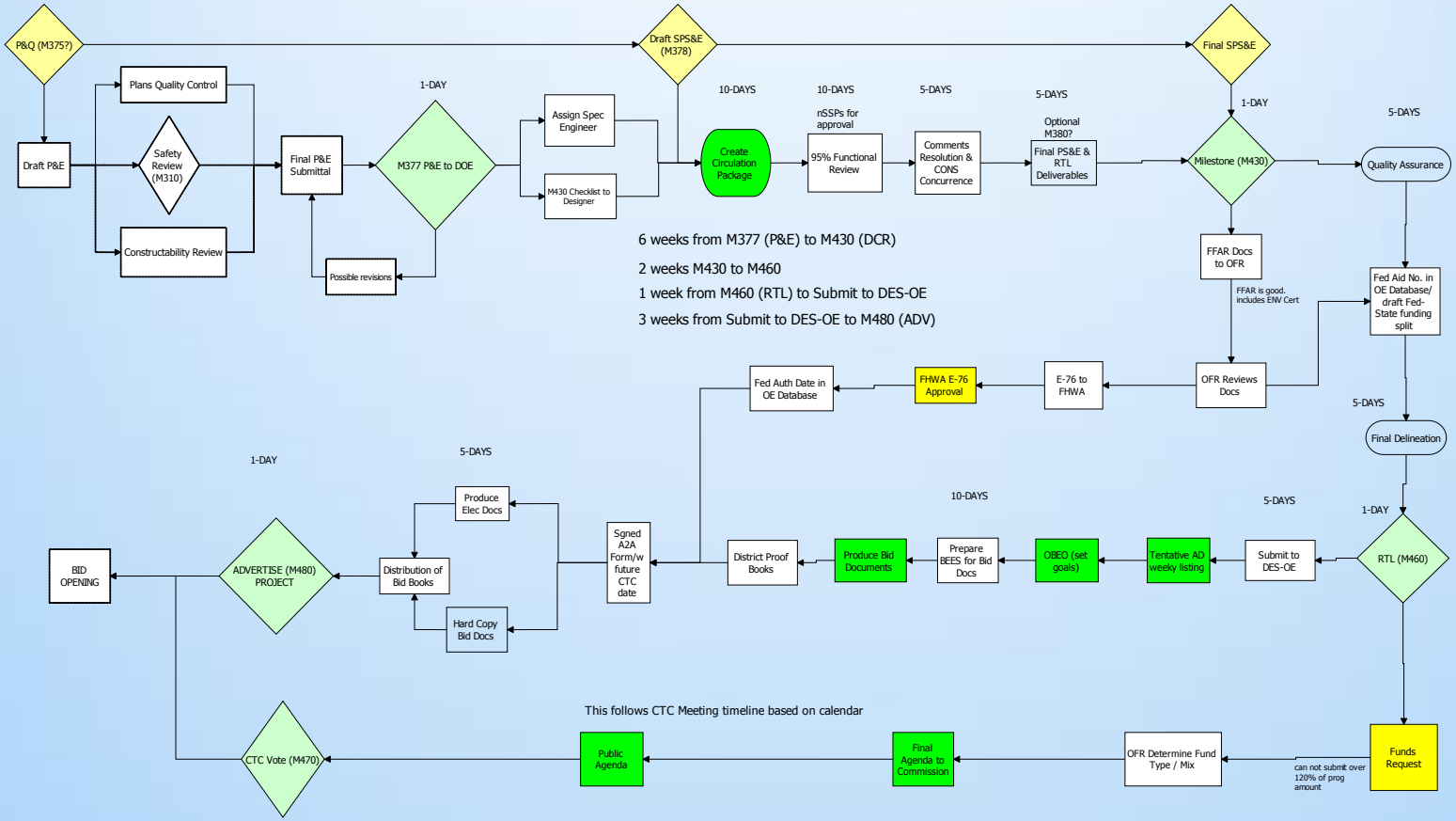
Critical X's (root causes of delays)

- Complex project with unclear scope elements and estimate.
- Unclear specification editing instructions.
- Late design updates due to permit expirations and requirements.
- Late identification of non-standard specifications.
- Final plans not ready due to continuous design.
- Poor quality plans with numerous review comments.
- Standards updates throughout contract preparation.
- Functional deliverables not completed due to poor coordination.
- Federal approval delays due to incomplete submittals.
- Stage construction issues missed during early reviews.
- Contract misses the CTC funding allocation submittal date.

Improvement Techniques

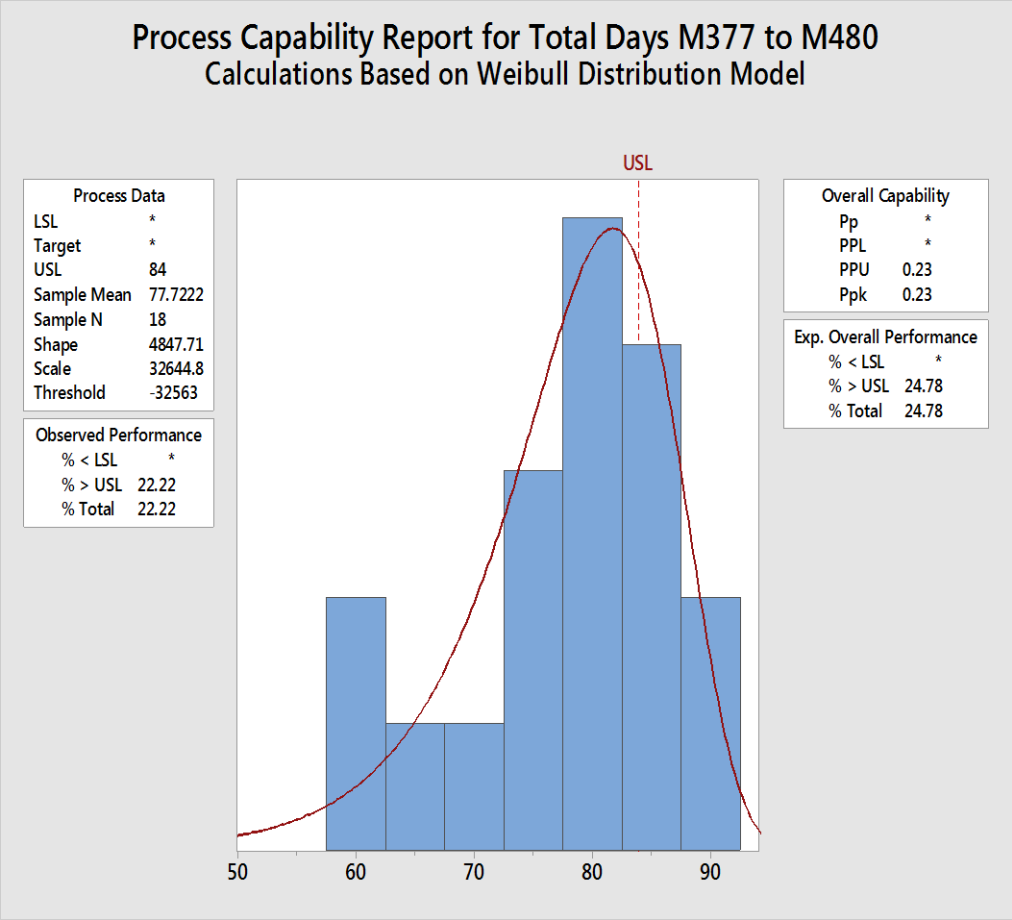
- Process map steps in parallel for District, Federal, and Headquarters activities.
- Early constructability and safety reviews.
- Revised checklists and templates to clarify requirements.
- Standard scheduling of safety and constructability reviews (milestone 430).
- Policy, process, and guidance revisions.
- Cross training of staff for peer reviews and quality improvement.
- Seeking delegation from FHWA and Caltrans HQ for certain activities.
- Simplification or elimination of non-value added steps.

New Process Map



- The new process map follows a 12-week timeline, incorporates parallel steps, early reviews, simplified checklists, and quality assurance tracking

New Capability Analysis



- New Process
- Upper Spec Limit 84 days (12 wks)
- Expected new average 77 days
- Expected Maximum 90 days
- 75% within Spec
- Non normal distribution

Control Plan

- Quality Assurance milestone for inspection, gathering, and analyzing data.
- Monitoring checklists and guidance to see how they are being integrated in the process, and identify areas of improvements.
- I-chart for overall completion
- Best Bid Standards (BBS) tracking for contract preparation.
- Continuous improvement plan including quarterly meetings for the first year of implementation.
- Pareto chart.

Additional Benefits

- Improved Plans Quality
- Better schedule management
- Trained engineering workforce
- Better customer satisfaction
- Consistent quality products
- Improved Morale

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